Prenatal Health Behaviors and Birth Outcomes

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Abstract

In the early 1990s, the District Board of Health of Mahoning County (Youngstown, Ohio) used pregnancy-related behaviors to assist the community in planning prenatal and birth outcome interventions. The first mappings of prenatal behaviors and birth outcomes were crude small-area-analysis maps by census tract and zip code, prepared by hand. Since 1994, the District Board of Health and the Mahoning County Planning Commission have prepared geographic information system (GIS) mapping of pregnancy behaviors and birth outcomes. These maps have assisted agencies and community collaboratives by highlighting high-risk census tracts indicating a need for public health interventions. With birth certificate data received from the Ohio Department of Health, frequency counts of key health indicators are computed. Prenatal and birth indicators include percentages of low birth weight infants, tobacco usage during pregnancy, trimester of entry into prenatal care, and number of births to teens ages 15 to 17. Census tract mappings of these indicators are made for the entire county, including all cities and villages.

Keywords: birth outcomes, birth weight, prenatal, smoking, teen births

Introduction

In the early 1990s, the Healthy Outcomes of Pregnancy Consortium for Mahoning County was established. The consortium goal was to reduce infant mortality in the community. Health behavioral indicators such as tobacco use during pregnancy, the trimester of entry into prenatal care, and the percentage of low birth weight infants were targeted for review and analysis. Small area analysis of these indicators by census tract as reported on birth certificate data was completed. Small area analysis maps by census tract and zip code were prepared by hand. Birth certificate information was gathered from lengthy printout sheets from the Ohio Department of Health, Vital Statistics Division. Various risk indicators were then hand-counted by census tract. The maps of the percentage or rate occurrence by census tract or zip code were hacked with pencil and ruler.

Methods

In 1996, the District Board of Health of Mahoning County and the Mahoning County Planning Commission combined expertise to create geographic information system (GIS) mappings of public health concerns in the county. On receipt of birth certificate

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data from the Ohio Department of Health, the Mahoning County Planning Commission assigns census tracts to all the records by first geocoding the home address of the child. Once the records are assigned census tracts, the District Board of Health analyzes them for specific public health indicators. The District Board of Health completes the birth certificate analysis using Statistical Analysis Software (SAS). Major prenatal and birth outcome indicators, such as percentages of low birth weight infants, tobacco usage during pregnancy, trimester of entry into prenatal care, and number of births to teens ages 15 to 17, are computed by census tracts. Census tract mappings of these indicators are then created through Atlas Mapping Software for the entire county, including cities and villages.

While the community's infant mortality rate and percentage of low birth weight infants have decreased, and the percentage of women entering prenatal care in their first trimester has increased, Mahoning County continues to have a high overall infant mortality rate and high percentage of low birth weight infants. This situation creates an ongoing need for analysis of prenatal and birth outcomes. The use of the more accurate GIS maps enables the community to better decide how to spend its dollars on the costly health behaviors of smoking, late or no prenatal care, and teen births.

Data

The percentage of women using tobacco during pregnancy for the entire county has decreased from 26% smokers in 1991 to 20% smokers in 1996. Figure 1 illustrates the disparity of smoking rates throughout the various census tracts in the county. Several census tracts have rates above 30%, while many are below 10%.

The fluctuation of the percentage of low birth weight infants (less than or equal to 2,500 grams) by census tract is visible in Figure 2. The percentage range of this map extends from 0% to greater than 20%. The maps of the various health behaviors and birth

Figure 1 Tobacco use during pregnancy (1996 birth certificate data).

Figure 2 Percentage of low birth weight infants (less than or equal to 2,500 grams) (1996 birth certificate data).

outcomes are illustrative of the disparity in risk factors and birth outcomes between census tracts.

An additional disparity between census tracts is apparent in Figure 3, which identifies the communities in need of an intervention to encourage entry into prenatal care as early as possible during pregnancy.

The GIS mapping of these public health indicators helps the community to target census tracts for public health interventions. Targeting interventions this way can save time, money, and other valuable resources. An initiative of the Mahoning County

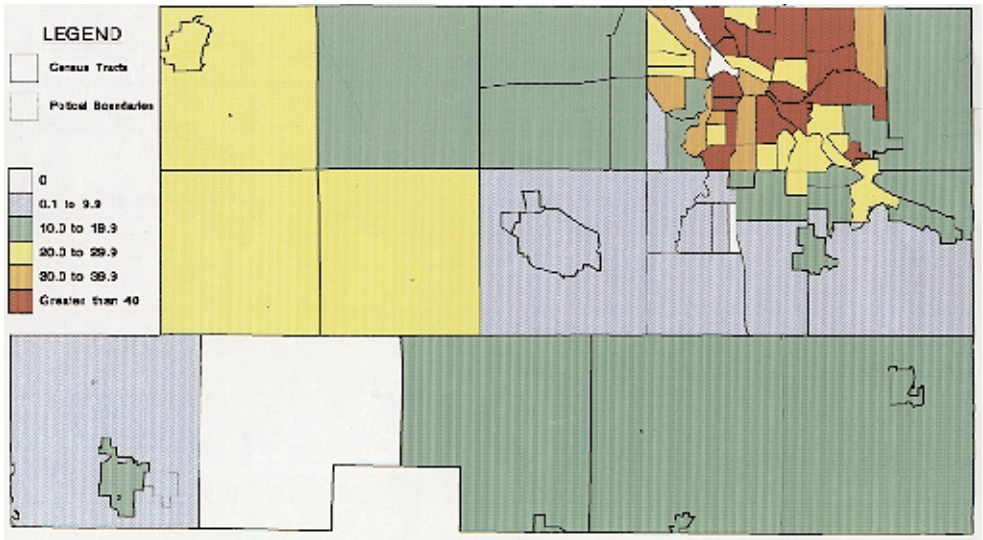

Figure 3 Percentage of mothers receiving late or no prenatal care (1996 birth certificate data).

Family First Council's Wellness Block Grant, Subcommittee for Healthy Children—the "Reducing Teen Pregnancy by Building Assets" project—is one example of the usefulness of a GIS map. The project used the mapping of 1995 teen pregnancy rates to target students grades, 5 through 9, in census tracts with inordinately high teen birth rates for after school programming and formal education in the corresponding school system.

The evaluation built into the grant includes the census tract mapping of teen pregnancy rates in subsequent years (Figures 4a, 4b). Targeted and untargeted census tracts will be analyzed for changes in teen birth rates.

Figure 4a Rate of births to school age teens, 15 to 17 years of age (1995 birth certificate data).

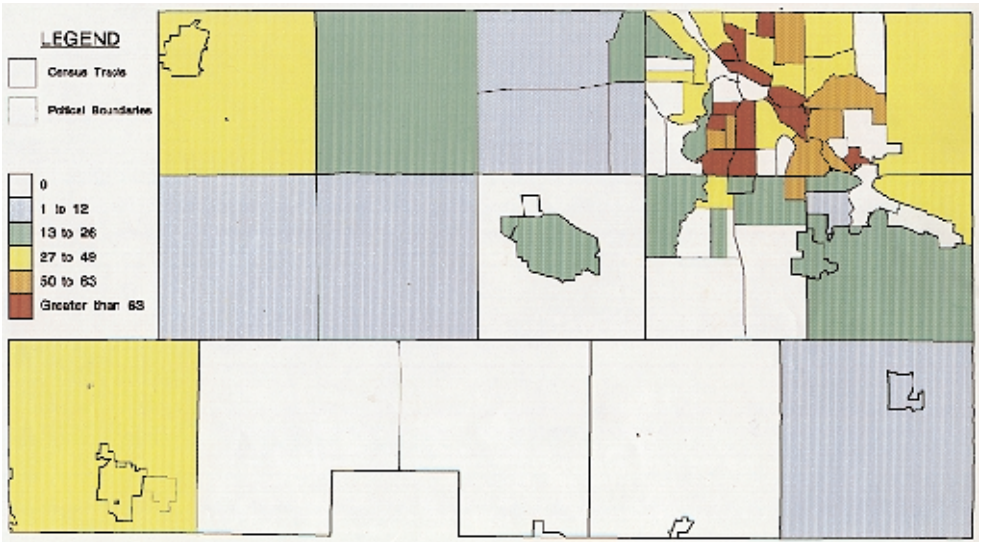

Figure 4b Rate of births to school age teens, 15 to 17 years of age (1996 birth certificate data).

Besides using the data on prenatal behaviors and birth outcome to help with decisions on targeting high-risk communities, the District Board of Health also uses the data to prepare a "Health Report Card" for all villages, cities, and townships within its jurisdiction. The report card includes prenatal health behavior and birth outcome rates for the particular census tract or tracts of villages, cities, or townships. This information affords an opportunity to compare a particular area with the total county, the complete health district, and/or the major city of Youngstown. It also acts as a catalyst for community health-related interventions in schools, churches, and community organizations.

The District Board of Health and the Mahoning County Planning Commission cooperate to produce the following GIS mapping projects, as well: location of landfills; prenatal patient distribution; physician participation in our children's health insurance program; well child patient distribution; rabid raccoon reports; animal bites; tuberculosis cases; and maps for the lead-based paint hazard control program.

Conclusion

The cost involved with developing a good analysis and mapping program includes computers, training, and software. The District Board of Health costs include the yearly SAS contract, the monthly birth certificate data disks, computers able to handle the software, staff training and time, the billing by the Planning Commission for the census coding of the birth data, and the preparation of the maps. The Mahoning County Planning Commission costs include computers, staff training and time, and the Atlas GIS Software.

In summary, GIS mapping of pregnancy behaviors and birth outcomes in Mahoning County has been successful in assisting agencies and community collaboratives to visualize high-risk census tracts needing public health intervention. By illustrating areas of various health-related risk behaviors, the maps have enabled these agencies to prepare specific interventions that meet their communities' needs.